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Economic analysis of a water recirculation system catfish farm

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Abstract

The operational costs and revenue generation of a catfish farm operating water recirculation system was analyzed from May 2007 to April 2008. The farm operated the Dutch Model system with annual capacity of 30 tons of African catfish for grow-out facility. It had a small hatchery using water flow-through system. Total operational cost for 12 months period was ₦1, 058,288.00 ranging from ₦ 48,400 to ₦116, 850.00 monthly. Similarly total revenue generated was N1, 166,220.00 with a monthly range of ₦33.670.00 to ₦68, 890.00. The gross profit for the period of study was ₦107, 932.00 which was very minimal. The highest expenditure item was salaries accounting for 34% followed by fish feed which accounted for 32% of the total costs. The catfish farm was not operating at full capacity at the time of this study. However the analysis has highlighted that payment of salaries and feed procurement were major expenditure items that will determine the profitability of this investment. Consequently, reduction in salaries and feed costs will reduce the operational costs and thus make the project more viable.

Keywords: Operational cost, revenue, profit, aquaculture.

Introduction

Aquaculture in Nigeria in recent years is growing, striving to satisfy the demand for fish in the country. FAO (2003 & 2006) classified aquaculture as the world's fastest growing food production sector for two decades with a growth rate of 11% per year since 1984 when compared to 3.1% for terrestrial farm animal meat product. Nigeria in her effort to boost aquaculture production adopted the Dutch model of intensive production of African mud catfish in water recirculation system (WRS) in the last decade. This is in response to concerted effort to reduce importation of frozen fish which gulps over $500 million dollars annually – a huge drain in her foreign exchange reserve.

Nigeria is endowed with enormous water resources and aquaculture potential, as has been estimated to be about 2.5 million tons. With the introduction of intensive catfish culture in WRS in 1995 as a business venture, there was a boom in catfish farming with aquaculture production doubling from 25,000 in 1995 to 80,000 tons in 2005 (Anyanwu et al., 2005; FDF 2007). This has placed Nigeria among the leading countries in aquaculture production in Africa. This increase has also resulted in high investment profile for the intensive culture system. Fish reared in WRS must be fed nutritionally balanced diet to ensure faster growth and high survival rate and the high cost of fish feed increases operation cost. There is dearth of information on actual operational cost in WRS in Nigeria. This study examined the expenditure items and revenue records of a private fish farm in Lagos, Nigeria that operate an intensive WRS catfish farm.

Materials and Methods

The financial record books of a private fish farm at Idado Estate, Eti-Osa Local Government Area of Lagos State were analyzed. The farm had a 30 tons catfish grow-out facility made up of 10 fibre glass tanks of $3m^3$ each, and a catfish hatchery producing 50,000 fingerlings per cycle of 8 weeks. The brood stock unit comprised of three ($3m^3$) fibre glass tanks. Other facilities include a 20 KVA generator; two 2HP and three 1HP surface water pumps, water treatment unit and a bore hole. The farm employed three staff (one manager and two farm attendant) at the time of study. The fish cultured in the system was *Clarias gariepinus* and the stocking density was 320 fish/ m^3. Grow out period was five months. The fish were fed with Coppens feed three times daily at 5% body weight.

Sale of fish was carried out daily on the farm. Maintenance work was carried out mainly on the generator set, water pumping machines, and electrical fittings. The cost of repairs/maintenance was recorded monthly for a period of 12 months. Other cost recorded included: cost of feed, cost of diesel, phone calls, PHCN bills, transportation, electricity and salaries for

the same period. The monthly income from sales of fish was also recorded.

Results

The total cost incurred during the period was N1,058,288.00. The highest cost of expenditure was salary accounting for 34% of the total cost followed by feed accounting for 32%. The generator repair and diesel took 16% of the total expenditure, while PHCN bill and pump repair were 6% and 4% respectively. The lowest cost was phone call accounting for 0.98%. Details of the monthly expenditure are presented in table 1. The total revenue recorded during the period was N1, 166,220.00, with sales of brood fish generating the highest revenue accounting for 44.3% of total revenue while fingerling production generated the lowest revenue of 0.17% (Table 2).

Table 1: Monthly expenditure (in naira) of the farm during the period of study

Items	May 2007	June 2007	July 2007	Aug. 2007	Sept. 2007	Oct. 2007	Nov. 2007	Dec. 2007	Jan. 2008	Feb. 2008	Mar. 2008	Apr. 2008
Diesel	15,600	11,875	8,000	17,000	3,000	9,500	4,000	9,535	2,000	2,000	–	2,600
Gen.	13,450	4,540	6,910	9,500	5,250	2,500	28,900	13,250	1,000	–	3,000	1,250
Pumps	6000	3,550	1,150	8,300	7,000	1,250	300	8,600	3,700	–	1,500	1,500
Feed	32,500	40,460	21,500	40,280	39,000	37,000	21,750	27,000	12,000	12,000	6,700	37,400
PHCN	10,000	7000	4,000	6,000	5,000	5,000	5,000	8,000	3,000	3,000	3,000	3,000
Trans.	4,850	2,300	2,400	4,150	2,550	4,700	4,250	3,790	560	500	1,000	2,650
Elect.	3,450	1,100	480	1,000	–	11,450	5,800	4,100	1,000	550	2,500	1,500
Phone	1000	500	1000	–	1,000	1,500	1,300	2,500	1,000	200	100	300
Salary	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000
Others	–	–	2,500	–	1,000	6,250	3,110	–	–	900	600	–
Total	118,650	101,323	77,940	116,230	93,800	109,150	104,410	106,775	54,260	49,150	48,400	80,200
GRAND TOTAL ₦1,058,288												

Gen = generator, PHCN = Power Holding Company of Nigeria, Trans = transport, Elect = electricity

Table 2: Monthly revenue generation of the farm during the study period.

Items	May 2007	June 2007	July 2007	Aug. 2007	Sept. 200	Oct. 200	ov. 2007	Dec. 2007	Jan. 2008	Feb. 2008	Mar. 2008	Apr. 2008
Table fish	65,000	48,380	45,370	22,810	28,500	67,480	51,120	35,500	24,430	17,400	28,200	16,950
Broodstock	173,880	47,600	30,540	141,360	4,800	15,360	30,520	13,540	9,240	19,440	12,600	18,000
Fingerlings	30,000	35,000	2,500	–	17,000	20,000	14,000	–	–	–	–	80,000
Total	268,880	130,980	78,410	164,170	50,300	102,840	95,640	49,040	33,670	36,840	40,800	114,950
GRAND TOTAL N1,166,220												

Discussion

Data obtained from this study showed that salary had an average expenditure of 34% for twelve months and feed had the second largest average expenditure of 32%. Ugwumba and Chukwuji (2010) reported that cost of feed constituted 73.50% of the total cost of production in fish farm. Also Uguumba and Nnabuife (2008) identified high cost of feed as a serious drawback to profits realizable from catfish farming. This was so because even if the sales of fish were low, money will still be expended on items like salaries, feed, energy and repairs etc. Consequently, there is need for continuous production and fish sales monthly. Farm workers must be made aware that salaries were paid from revenue generated from the farm and if fish sales were low, there will be reduction in profit. Also feeding in WRS must be regulated and adequate at all time for effective production. From the analysis, energy supply (generator, diesel and PHCN bills) accounted for 20% of the total expenditure.

Conclusion

This study has highlighted that payment of salaries, procurement of feed and energy cost were major expenditure items with salaries being the highest cost. Reduction on salary and feed costs and increase in fish sales will increase the profit margin.

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